

## **IEM's AI Modeling: Short-term COVID-19 Projections**

**Date: 12/3/20**

Leveraging over 15 years of support to HHS for medical consequence modeling and our proprietary artificial intelligence (AI) models, IEM believes that our Coronavirus model outputs can be used to assist localities and their medical facilities to better prepare for an increase in hospitalizations, to better plan for and locate drive-through testing facilities, and to determine where increased levels of transmission may be occurring.

**We have been refining our AI model over the past month and are confident in its ability to provide accurate 7-day projections that can be used for operational and logistical planning.**

### **AI-based Model Background**

IEM is currently using an AI model to fit data from various sources and project new cases of COVID-19. We do not assume the average number of secondary infections (R-value) stays the same over time. IEM's AI model finds the best R-value over time to evaluate how it changes over the course of the outbreak. The IEM modeling team is running ~11 million simulations to fit each state's data and using the best fit for the R-value to project new cases over the next 7 days. The AI models are executed on a daily basis to evaluate the changing dynamics of the COVID-19 pandemic. Our projections have typically been within 10%, and are often within 5%, of actual confirmed cases.

The projections shown in this document are based on data pulled in as of 12/3/20 9 a.m.

**Please provide any feedback or send any questions that you might have to us. We are continually updating and improving the model, so your feedback is critical.**

**Also, if you have more current or refined data for your State, Commonwealth or Territory that you would like IEM to factor in, please let us know.**

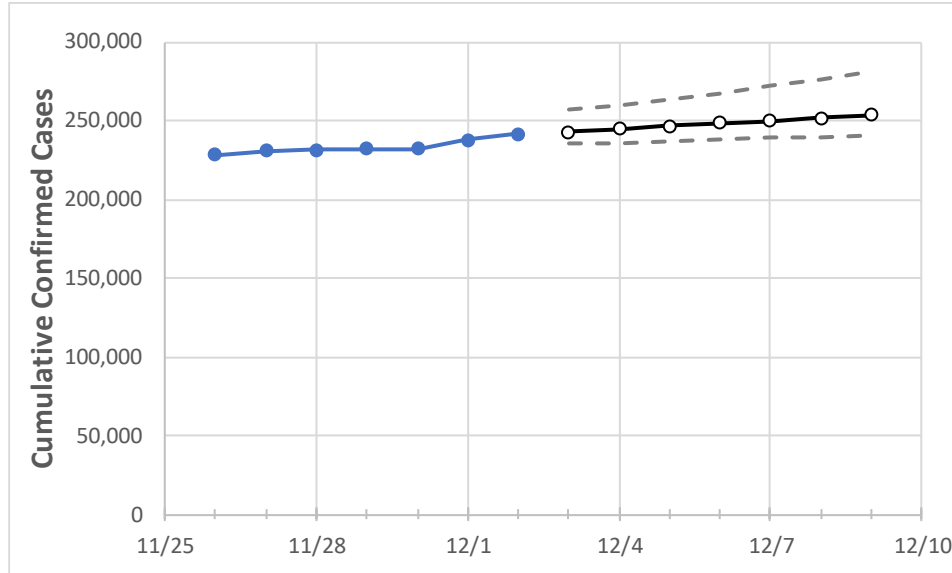
### **IEM's Modeling Lead**

Dr. Prasith "Sid" Baccam is a **Computational Epidemiologist expert** at IEM with more than **20 years of experience in medical consequence modeling and simulation of disease outbreaks** and medical consequences following hypothetical attacks with biological agents or emerging infectious diseases. He develops key simulation models and decision support tools at IEM, specializing in public health, disaster response, and medical countermeasures (MCM) to enhance data-driven decision making and improve modeling assumptions.

Upon receiving his **Ph.D. in Applied Mathematics and Immunobiology** at Iowa State University, Dr. Baccam worked as a Postdoctoral Research Associate at Los Alamos National Laboratory where he focused on researching viral and immunological modeling. After his stint at Los Alamos, Dr. Baccam has served as Task Lead in multiple public health projects have allowed him to develop expertise as a mathematical biologist and a leader on high-performance modeling and simulation teams.

He has worked with state and local public health officials as well as Federal agencies, including **HHS**, the Centers for Disease Control and Prevention (**CDC**), and the Department of Homeland Security (**DHS**). Dr. Baccam has published numerous papers on public health response models and implications on policy and has been invited to participate in workshops and symposiums held by the Institute of Medicine (now the National Academy of Health). His modeling results have been briefed to the **Executive Office of the President** and informed two presidential policy actions.

## Louisiana State Projections



	Actual Confirmed Cases On:					Projected Cases For:					
	11/29	11/30	12/1	12/2	12/3	12/4	12/5	12/6	12/7	12/8	12/9
Louisiana	232,245	232,414	237,740	241,335	243,022	244,739	246,488	248,270	250,084	251,931	253,812

**Note:** The State's projection shows a "best estimate" curve (the solid line with circles) and the dotted lines are the upper and lower estimates around that best estimate. Our projections have typically been within 20%, and are often within 10%, of actual confirmed cases.

## Louisiana Parishes

	Actual Confirmed Cases On:				Projected Cases For:						
	11/29	11/30	12/1	12/2	12/3	12/4	12/5	12/6	12/7	12/8	12/9
Ascension Parish	5,651	5,655	5,837	5,896	5,920	5,943	5,966	5,988	6,010	6,031	6,052
Bossier Parish	6,286	6,289	6,410	6,528	6,566	6,604	6,641	6,678	6,714	6,749	6,784
Caddo Parish	13,247	13,254	13,539	13,926	14,006	14,087	14,167	14,248	14,328	14,408	14,489
Calcasieu Parish	10,449	10,460	10,730	10,764	10,811	10,858	10,906	10,953	11,001	11,048	11,096
East Baton Rouge Parish	19,853	19,868	20,385	20,565	20,694	20,826	20,961	21,101	21,243	21,390	21,540
Jefferson Parish	22,603	22,609	23,160	24,084	24,283	24,490	24,706	24,930	25,164	25,407	25,660
Lafayette Parish	12,118	12,113	12,430	12,509	12,644	12,784	12,930	13,081	13,237	13,400	13,568
Lafourche Parish	4,730	4,754	4,852	4,882	4,928	4,976	5,026	5,079	5,134	5,193	5,254
Orleans Parish	15,834	15,838	16,077	16,421	16,513	16,606	16,701	16,798	16,896	16,997	17,099
Ouachita Parish	10,020	10,028	10,160	10,324	10,393	10,462	10,531	10,600	10,669	10,738	10,807
Rapides Parish	6,277	6,274	6,425	6,454	6,492	6,531	6,570	6,610	6,651	6,693	6,735
St. Bernard Parish	1,809	1,807	1,853	1,885	1,902	1,921	1,940	1,961	1,984	2,007	2,033
St. Charles Parish	2,575	2,618	2,669	2,709	2,735	2,763	2,792	2,822	2,854	2,888	2,923
St. James Parish	985	988	1,002	1,011	1,018	1,026	1,034	1,042	1,051	1,061	1,071
St. John the Baptist Parish	1,991	1,992	2,022	2,042	2,053	2,064	2,075	2,086	2,097	2,109	2,120
St. Tammany Parish	10,383	10,379	10,678	10,878	11,024	11,177	11,340	11,511	11,692	11,883	12,085

Some recipients of our daily COVID-19 short-term (7 day) projections have requested projections of demand for: hospital bed, intensive care unit (ICU) beds, and mechanical ventilation. We realize that different states and localities will have different characteristics for hospital demand of COVID-19 cases, and we are presenting the best assumptions we could find for those medical demands based on scientific literature and health data reporting. Specifically:

- **Beds:** For hospitalization, we use a range of 10% and 20% of cases require hospitalization based on CDC's report ([MMWR, March 18, 2020](#)) and state reports of COVID-19 cases.
- **ICU:** The CDC report found that 24% of hospitalized cases require ICU care.
- **Ventilators:** Based on clinical data from China and state reports, we assume that 50% of ICU cases require a ventilator.

If you have other estimates for these assumptions, please share them with us as we work to refine our modeling, assumptions, and data on a daily basis.

The medical demands shown in the table assume 20% of **cumulative** confirmed cases require hospitalization. To get the medical demand for the assumption that 10% of confirmed cases require hospitalization, simply divide the demand by 2.

### Louisiana Medical Demands by County

	Actual Confirmed Cases On:				Projected Cases (Hospitalized) [ICU] {Ventilator} For:											
	11/29	11/30	12/1	12/2	12/4				12/6				12/8			
Ascension Parish	5,651	5,655	5,837	5,896	5,943	(1,189)	[285]	{143}	5,988	(1,198)	[287]	{144}	6,031	(1,206)	[289]	{145}
Bossier Parish	6,286	6,289	6,410	6,528	6,604	(1,321)	[317]	{159}	6,678	(1,336)	[321]	{160}	6,749	(1,350)	[324]	{162}
Caddo Parish	13,247	13,254	13,539	13,926	14,087	(2,817)	[676]	{338}	14,248	(2,850)	[684]	{342}	14,408	(2,882)	[692]	{346}
Calcasieu Parish	10,449	10,460	10,730	10,764	10,858	(2,172)	[521]	{261}	10,953	(2,191)	[526]	{263}	11,048	(2,210)	[530]	{265}
East Baton Rouge Parish	19,853	19,868	20,385	20,565	20,826	(4,165)	[1,000]	{500}	21,101	(4,220)	[1,013]	{506}	21,390	(4,278)	[1,027]	{513}
Jefferson Parish	22,603	22,609	23,160	24,084	24,490	(4,898)	[1,176]	{588}	24,930	(4,986)	[1,197]	{598}	25,407	(5,081)	[1,220]	{610}
Lafayette Parish	12,118	12,113	12,430	12,509	12,784	(2,557)	[614]	{307}	13,081	(2,616)	[628]	{314}	13,400	(2,680)	[643]	{322}
Lafourche Parish	4,730	4,754	4,852	4,882	4,976	(995)	[239]	{119}	5,079	(1,016)	[244]	{122}	5,193	(1,039)	[249]	{125}
Orleans Parish	15,834	15,838	16,077	16,421	16,606	(3,321)	[797]	{399}	16,798	(3,360)	[806]	{403}	16,997	(3,399)	[816]	{408}
Ouachita Parish	10,020	10,028	10,160	10,324	10,462	(2,092)	[502]	{251}	10,600	(2,120)	[509]	{254}	10,738	(2,148)	[515]	{258}
Rapides Parish	6,277	6,274	6,425	6,454	6,531	(1,306)	[313]	{157}	6,610	(1,322)	[317]	{159}	6,693	(1,339)	[321]	{161}
St. Bernard Parish	1,809	1,807	1,853	1,885	1,921	(384)	[92]	{46}	1,961	(392)	[94]	{47}	2,007	(401)	[96]	{48}
St. Charles Parish	2,575	2,618	2,669	2,709	2,763	(553)	[133]	{66}	2,822	(564)	[135]	{68}	2,888	(578)	[139]	{69}
St. James Parish	985	988	1,002	1,011	1,026	(205)	[49]	{25}	1,042	(208)	[50]	{25}	1,061	(212)	[51]	{25}
St. John the Baptist Parish	1,991	1,992	2,022	2,042	2,064	(413)	[99]	{50}	2,086	(417)	[100]	{50}	2,109	(422)	[101]	{51}
St. Tammany Parish	10,383	10,379	10,678	10,878	11,177	(2,235)	[537]	{268}	11,511	(2,302)	[553]	{276}	11,883	(2,377)	[570]	{285}

For additional information from IEM, please contact Bryan Koon, Vice President of Emergency Management and Homeland Security at [bryan.koon@iem.com](mailto:bryan.koon@iem.com) or 850-519-7966 or Stephanie Tennyson at [stephanie.tennyson@iem.com](mailto:stephanie.tennyson@iem.com) or 202-309-4257.